

INVENTION
 OF AN
 EFFECTIVE AND UNFAILING METHOD
 FOR FORMING AN
 INSTANTANEOUS COMMUNICATION WITH THE SHORE
 IN
 SHIPWRECK,
 AND
 ILLUMINATING THE SCENE
 IN
 THE DARK AND TEMPESTUOUS NIGHT.

"Homo sum : humani nihil a me alienum puto."

TERENCE.

By JOHN MURRAY, F. S. A, F. L. S, F. H. S, F. G. S.

Member of the Meteorological Society of London, and of the Wernerian Society of Edinburgh ; 'Honorary Member' of the Medico-Chirurgical Society of Hull, of the Medical Society of Inverness, of the Philosophical Societies of Sheffield and Hull ; and of the Mechanics' Institutes of Exeter, Devonport, Portsmouth, Hull, York, Halifax, and Bristol ; 'Corresponding Member' of the Northern Institution, the Horticultural Society of Edinburgh, &c. &c.

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TO
THE RIGHT HONOURABLE
BARON BROUGHAM AND VAUX,

LORD HIGH CHANCELLOR OF GREAT BRITAIN,

F. R. S. &c. &c. &c.

MY LORD,

By submitting for your Lordship's approbation, this application of the conjoined powers of chemical and mechanical principles to the saving of human life, I may be considered desirous of placing my exertions in too prominent a light,—a foreground they ought not to occupy. The motives, however, which excited me to enquiry and experiment, lie deeper than an appeal to man; though, free to confess, I feel anxious to obtain the favour of your Lordship's good opinion of this direction of the fruits of science to a deeply-interesting object.

It is an appalling fact for reflection, that of the passengers and crew of *twenty-eight* vessels wrecked in the dreadful storm of last month, between Plymouth and Land's End, only *two men and one boy* were saved!

How far my endeavours to contribute the aids of scientific discoveries to cases like these, may be honoured with the welcome of a master-mind, it is not for me to determine; at all events, this opportunity enables me to express my best wishes that your Lordship's merited honours may be long enjoyed.

I have the honour to be,

My Lord,

Your very humble and most obedient Servant,

J. MURRAY.

Bristol,
24th January, 1831.

ADVERTISEMENT.

A RECENT visit to Whitby, and survey of that dangerous coast, with the prospect of the winter's approach, have renewed my exertions and roused additional efforts in the cause of suffering humanity, and on behalf of a gallant and fearless race, in whom the nation reposes an ample trust. To carry into effect, however, measures of security or safety, requires more than the uncombined exertions of a solitary individual, however exalted his attainments or extensive his influence. All, therefore, that can be done by, or expected from, such an insulated source, is the presentation of the tale of truth, descriptive of the claims it urges on public attention; and the simpler its attire the more acceptable is the letter of recommendation likely to be. In the following pages there will be found, therefore, no discursive flights explanatory of its great object, nor elaborate colouring of the perils of shipwreck. Imagination may brood over the scene of her fancy, but the full account of suffering cannot be portrayed. These pages are few and simple, and fact not fancy is my sole aim. A candid detail, therefore, grounded on the plea of suffering humanity, and void of adventitious shew, is the full amount of my pretensions. I shall always feel anxious to secure the meed of public approbation, and be proud to possess it. It is the only

reward I wish for, for all my cares and anxieties and pecuniary sacrifices; and in reference to the latter, it were dishonest to conceal that my repeated efforts in the sacred cause of philanthropy, have, from time to time, pressed heavily on my moderate means; and those who are best acquainted with the rise, progress, and maturity of discovery, in its application to practical usefulness, will most readily acknowledge the full force of this truth.

To improve the original invention, and provide against contingencies, may require many new adjustments and changes of what may have been built on the principle and plan; for accidental circumstances must of necessity be calculated, and these may not present themselves at once, but by slow degrees, when the discovery is brought to bear on any department of the economy of life. This faithful *caveat* will anticipate whatever charges may be brought against me, as having been, through such channels, not often carried beyond the bounds of a cold, calculating prudence, or the lukewarm temperament of that passive duty, which the charities of the heart seldom animate. I, however, cannot but take a deep interest in the scene, when humanity summons me to the field. May my country approve the enterprize, and not consider me an ungrateful and unworthy son! It would indeed be a distressing reflection to me, were my name, humble though it is, eventually discovered to have been a mere blank in the volume of usefulness, or only added to the worthless list of the unprofitable of my species, who seem to have been born only to die. And, when time may have closed the account with me, I trust my family shall not have it in their power to arraign against my memory the indictment of having lived in vain.

There are perhaps few individuals who have had greater difficulties to encounter in the transcription of ideas than

myself. With little else than disjointed notes or fragments of memoranda, and the acts of memory, to depend upon, have my various volumes been composed and written; my laborious and incessant avocations precluding me altogether from the enjoyments of the Literati, and the calm retreats of study; hurried, indeed, and often interrupted, such, therefore, must necessarily have been; and when in these distracted moments I have prepared my manuscript for the press, I had no friendly hand to lop off any unsightly ramification, or prune its luxuriance. I do not obtrude these observations and explanations to deprecate criticism; had such been my intention they would now be far too tardy to avail me any thing. The public has already often, through the medium of the press, expressed its favourable opinion, and I am satisfied and grateful. I am proud of the approbation, because these suffrages have been *unbiassed and unpurchased*. I, at least, shall never consent to the accompaniment of a *douceur* with any works of mine to Reviews; and if the spell of silence is to be broken by a bribe, that quiet shall ever be undisturbed by me. I equally scorn the penny trump of fame.

It would be ungrateful in me were I to omit the record of my obligations to my friends, Richard Moorsom, Esq. Rev. George Young, A. M. Mr. G. Ripley, and others of Whitby, whose anxiety to second my endeavours, and facilitate my experiments, demand the tribute of my best acknowledgments.

I would on no account be understood to undervalue Captain Manby's Invention, or his exertions; such an unmanly thought has no place with me. I would, on the contrary, laud them to the very echo, and bid it applaud again. An enterprize like his requires more gifted powers than I possess to tell the full story of its generous worth; but I can silently

admire, though unable to proclaim the history of its excellence. My ambition apes no rivalry here ; it assumes a humbler level : my earnest desire is to be considered a coadjutor and auxiliary with him in the sacred cause of philanthropy—I ask no more.

It is presumed that the plan now submitted to the public is available when and where Captain Manby's apparatus cannot be used or be brought skilfully and with success to bear. Besides being universally applicable, from its extreme simplicity, and always certain in its aim, it superadds this valuable advantage, that the line it conveys will *never break*, a circumstance of the utmost importance. It is admitted that these are high and bold pretensions, which, however, it is confidently believed the invention will fully sustain. During the darkness of the night, the arrow from the gun will carry a brilliant globe of intense light, kindled by the mere resistance it meets with in its transit through the atmosphere, and thus illuminate the parabolic path of the arrow and the scene of shipwreck with a flame which may defy the deluge of the tempest to quench. Here then is surely no rivalry ; it is rather a twin adjunct to save from the ruins of shipwreck, and not the most remote attempt to snatch even a solitary leaf of the laurel-crown of its elder brother. No !—May Captain Manby long wear the garland of oak, the reward of such, in the days of the Cæsars and of Imperial Rome, as had saved the life of a citizen !

“ Atque umbrata gerunt civili tempora quercu.”

EXPLANATION OF THE PLATE.

THE highest figure represents the form of the arrow, as best constructed for the *common blunderbuss*, and may be propelled immediately from the shore, or carried with the life-boat. The but-end carries a thin metallic shield, or plate, which may be made of copper. The point is sharp and barbed, to fasten where it may strike, or act as a holdfast on the tackling or rigging of the wreck. It is shod with iron, as well to subserve this purpose as to secure its direction and compete with the resistance it must encounter in a storm. The wood used is hiccory, or ash, or, still better, *lance-wood*, the more cohesive the fibre the better; this is withled in its extreme length with whip thread or line; bands or ribbons of thin metal strengthen the arrow, where the bent extremities of the parallel iron rod pass through, and which last are further secured by a shoulder on one side and a nut on the other. Along this parallel rod glances the iron ring to which the line is attached, the instant it leaves the gun, and a bit of cork, or caoutchouc, toward the end of the arrow, interposed between the rod and the body of the arrow, acting as a recoil spring, will so far subdue the effect of friction.

The entire weight of the arrow, thus plumed and shod, is from two to three ounces, 18 inches long, and three-quarters of an inch in diameter. These dimensions and weight have been found most efficient and successful when applied to a blunderbuss 16 inches long in the barrel, and $1\frac{1}{16}$ inch diameter in the calibre. The entire weight of the arrow and its appendages, together with the strong whip-cord attached to it, was two pounds and one ounce, and were carried to an extent of nearly one hundred yards by two drachms of gunpowder. The cord was of sufficient strength to pull a rope from the shore large enough to form a communicating medium of escape from the wreck.

The lowest figure of the plate exhibits the arrow applied to a three-pounder swivel, the calibre of which, however, though *not* represented in the plate, it ought nearly to fill. In this case the arrow and its various adjustments weigh together nearly two pounds; and with three ounces of gunpowder a line of considerable strength and power will be propelled upwards of a hundred and fifty yards. In this instance

a macharel or deep sea-line may be used. The cord is represented as coiled in the form of what is called *French faking*, and was the plan adopted in all our experiments, while it seems best adapted to preserve the coils from being entangled—a circumstance of the highest importance in experiments of this description. The barb is removed here to render the appearance less complicated.

The arrangement is supplied with an appendage for illuminating the flight of the arrow and scene of shipwreck. It consists simply of a cylindrical sheath, or socket, containing the materials of illumination, consisting of a mixture of finely-powdered *chlorate of potassa* and *sugar-candy* intimately blended together. A spindle supplied externally, with a flat head, enters by its extreme end into a miniature phial supplied with sulphuric acid, sealed with a drop of bees' wax. As soon as the arrow leaves the gun, the reaction of the air on the head of the spindle drives inward the plug of wax and liberates the acid, which instantly kindles the mixture, the brilliant flame immediately fills the globular cage of wire gauze which surmounts it, and the intensity of the light is rendered still more dazzling and splendid by adding a bit of phosphorus to the inflammable powder. This part of the apparatus is made altogether independent of the arrow, and may be easily attached when circumstances require it, as when the darkness of the night renders it imperative. The combustion which forms the source of the illumination, cannot be quenched either by the sea spray or a deluge of rain, the medium of support being supplied from itself, altogether independent of the external atmosphere, however charged with watery vapour or rain, and the combustion is too fierce to be at all affected by the wind, even at its maximum degree of strength.

Models of the arrow, &c. will be sent to—

The Admiralty.

National Institution for Preservation from Shipwreck.

Royal Humane Society.

Committee at Lloyd's.

Phoenix and Sun Fire-Offices.

Philosophical Institution, Liverpool.

_____ Bristol.

_____ Hull.

_____ Plymouth.

_____ Whitby.

_____ Portsmouth.

INVENTION,

§c.

When we contemplate the patriotic and philanthropic enterprize and exertions of a Congreve, a Marryat, a Manby, a Dansey, and a Greathead, with a long list of worthies that do honor to human nature and are gems in their country's crown, who would refuse his assent to the axiom, that "the seat of the useful arts,—of those which mankind bless and by which they are blessed,—of those which the heart reveres and the understanding approves, is BRITAIN?" *

A topic of such paramount importance as that of forming a line of communication with the shore, and saving from shipwreck, has occupied my mind for many years, and numerous and repeated have been my experiments; and though I developed my views partially in the *Edinburgh Philosophical Journal* in 1823, they were less matured than now when the plan is perfected, and a long chain of varied experiments has proved the invention available and of universal application in forming an immediate medium of escape from the wreck. I, in common with thousands—with all whose hearts are not chilled by the stoicism of insensibility—must have shared this feeling of anxiety to render aid to the mariner when tempest-tost, or, driven among rocks, he is left "to the chance of the moment, or the mercy of the winds or the waves; or rather let us say, to a greater mercy and a higher

* *Edinburgh Review*, Vol. xxxii. p. 388.

power.”* I would willingly, therefore, as far as I am able, contribute my humble share to the general weal, and co-operate in this enterprize with the excellent ones of the species.

The invention of Captain Manby affords a most gratifying spectacle to the eye of the Christian and the philanthropist, for we are here summoned to witness the murderous gun transformed by a glorious spell into the messenger of protracted life, and the deadly ball, guided by an Omnipotent Providence, fraught with the celestial message—“YE SHALL LIVE, AND NOT DIE.” This invention, however, it is much to be regretted, is not always available. The rope too frequently snaps, and it may happen at the most trying juncture. Besides all this, its massive and ponderous volume is not easy of transport from the scattered stations where it is to be found—nor is it an easy matter, without proper training and frequent exercise, to adjust the poise and parabolic range. I am informed by a gentleman who witnessed a series of experiments made some years ago with Captain Manby’s apparatus, at Brighton, that the rope broke fourteen times out of twenty. In one instance, off Whitby, in 1820, the shot in the first attempt fell short, and in the second instance the rope broke—the ship was buried in the breakers, and the crew perished. The distance of this vessel from the shore was not more than 60 yards, and a scientific friend, who was then at Whitby, assured me afterwards, that in all probability my invention would have saved the crew.

Occidat quod non servat.

The disastrous circumstance of a shipwreck off the coast of the Isle of Man, in which the crew and passen-

* Sir William Hillary.

gers, to the number of thirty individuals, were consigned to the watery abyss, at a distance of less than fifty yards from the shore, first led me to consider the practicability of using the *common musket* in such cases; the distance, from being inconsiderable, might, as it appeared, be easily overcome, and the musket or blunderbuss could be obtained almost everywhere. I acted under the impression, that if a small tough line could be propelled to the required distance, it would have strength sufficient to pull on board, especially when the buoyancy of the water through which it passed was considered, the double of a log or deep sea line, and this last be stout enough to bear a rope of sufficient strength and tension to form a safe and effective line of communication between the shipwreck and the shore. My experiments were first made in the summer of 1817 on the sands between Douglas and Mona Castle, in which I was assisted by Captain Garbett, R.N. and several other gentlemen, all anxious to promote my views. In these numerous trials a musket bullet was employed. To this was again attached whipcord. In every experiment, however, the cord immediately broke, as was the case also with silk-line, cat-gut, Indian-weed, hair-cord, brass-chain, &c. I was, therefore, under the necessity of abandoning all hope of success from these means, which, however, pointed out the cause of the rope breaking in Captain Manby's apparatus, and proved the indispensable necessity of a shallow mortar and shell, while it shewed that any lengthened form of ordnance must prove useless and abortive in the propulsion of a line in immediate conjunction with the ball. No strength of pliant materials seemed from these experiments sufficient to withstand the friction of

the bullet, which, from the extreme rapidity of its flight, must of necessity abrade and cut the portion of the line which enters into the barrel of the musket or the gun. After much thought and reflection, it occurred to me that this misfortune might be remedied by adopting a different principle; and accordingly, in the year 1820, I instituted, near the banks of the Caledonian canal, a series of experiments of a different kind, in which I was attended by Mr. Matthew Adam, A.M. Rector of the Inverness Academy, and a few other friends. These experiments were all as successful as I could wish them to be, inasmuch as they completely established the principle I had, after considerable reflection, concluded would be efficient. *Arrows* of hickory, or ash, were employed, loosely fitted to the calibre of the musket, and were discharged with gunpowder, the charge being rather less than the usual quantity employed. The arrows were shod with iron at the tip, and the line threaded through an eye made for the purpose; the lower end terminated in a socket, which was always brought into complete contact with the wadding of the charge. By a musket, under these circumstances, the arrow carried a log-line to the average distance of two hundred and thirty feet, and in one case an iron rod conveyed a line to the extent of three hundred and thirty-three feet.—These numerous experiments proved that the line by this arrangement would preserve its integrity, and there was only a solitary case of its being broken. Thus an important step of advance was gained; but as the arrow was *reversed* in its transit through the air, and as this would interfere with its direction, the arrangement in the plate was finally adopted and found to answer every

purpose. Until last summer, however, I had it not in my power to repeat, under diversified circumstances, the experiments, with a view to the comparative estimate between a three-pounder gun and a blunderbuss, and ascertain the precise relative weights of the respective arrows, and comparative quantities of gunpowder. The experiments already referred to as made in 1820 in the North of Scotland, were published in the *Edinburgh Journal of Science*, and subsequent to this period it was suggested to propel the harpoon in the Whale Fishery. In 1823, I recommended this to the late Capt. Scoresby, of Hull, and which, if I am not misinformed, is the principle of what is called the gun-harpoon, but which, up to this moment I have never seen. Reference to dates, however, will decide this question, though it is a matter of indifference to me. It is the application of the principle, the rise and progress of which I have detailed, to *saving men's lives*, not the destruction of whales, that I am now advocating, and in which I have taken so deep an interest.

Be it remembered that there are two distinct and different merits: one consists in the discovery of the *principle*, the other in the application of that fact to useful purposes, or to a distinct, peculiar, and definite object, different from any other to which it may have been hitherto applied. It is quite possible that a similar idea may have, in reference to the gun-harpoon, been entertained by another, but we believe that the principle ascertained to be successful by numerous experiments, and thus brought into effect, and before the public eye ten years ago, and soon after suggested and recommended to be employed in the discharge of the harpoon, is identical

with that of the gun-harpoon, first employed, if we mistake not, in 1824; and this suggestion having been adverted to in a little work of mine published in 1825, the explanation seems a necessary one. It will prevent any misapprehension, though it is a question in which I feel little interested. It may, however, be remarked, that the whale-fisher will find the principle applied to the *blunderbuss*, in the way I have discovered to be so successful, and carried out in the boat with him, far more certain and manageable than in the case of the gun, which, if I am rightly informed, from these and other causes, is seldom had recourse to. I only ask the award of merit rightly due to me. Even Captain Manby has not been suffered, unchallenged, to wear the civic wreath, and I cannot hope to pass unnoticed, concluding only in the words of the gallant author, “It remains for the public to determine whether the merit of a discovery is with the man *who not only produces but proves it.*”*

It is known that Captain Manby’s ingenious invention consists of the projection of a shell from a mortar, the shell carrying the rope with it; and the author has in his work, explanatory of the plan, supplied the following estimate of the range of the shell with various quantities of gunpowder. The experiments seem to have been made with a $5\frac{1}{2}$ inch brass mortar, and the shell projected against a strong wind at an angle of 17° , the mortar and bed weighing about 3 cwt.—

* Lieut. Bell, of the artillery, had laid before the Society of Arts, in 1792, a Plan for throwing a shell from a mortar from on board, and received fifty guineas for his experiments made at Woolwich.

4 ounces of gunpowder propelled 134 yards of $4\frac{1}{2}$ inch rope,
and 148 yds. deep
sea-line.

6	—	—	—	159 yards	do.	182	do.
8	—	—	—	184	—	do.	215
10	—	—	—	207	—	do.	249
12	—	—	—	237	—	do.	290
14	—	—	—	250	—	do.	310
32	—	—	—	439 yards	deep sea line.		
32	—	—	—	479	—	do.	
32	—	—	—	336	—	of two-inch patent	

Sunderland rope, capable of hauling the largest boat from
a beach.*

Some of these are very formidable experiments, and can rarely be made, from the bulk and weight of the mortar and its accompaniments. The length to which Captain Manby has extended the projection of the rope in his apparatus, will be materially diminished, when the line is wet or clogged with sand, and it has to encounter a violent gale. My two objects were portability and simplicity,—to render the principle familiar to every one and available on all occasions. Captain Manby recommends a platted hide protector over the eye of the shell, passing the rope through a case of leather, and to be so well secured at the eye of the shot as to leave no room for the slightest play. Notwithstanding all these precautions, we have been informed it not unfrequently snaps or is burned near the shell. By the recommendation of the Committee of 1814, a number of these mortars had been placed under the direction of the Preventive Service, but it is added that, “through ignorance

* An Essay on the Preservation of Shipwrecked Persons, &c. London, 8vo. Longman, 1812, p. 34.

or culpable remissness, the full success that might have attended the system had been defeated." Were a hollow arrow of laminated iron, on the principle I now venture to recommend, made to substitute the shell, and a gun to supplant the mortar used in Captain Manby's experiments, the result would, in all probability, prove a guarantee against the rope breaking, even with such a prodigious force of gunpowder, while the distance to which it would be carried might be even greater; since a shell, from its structure, must encounter a much greater resistance in its flight through the air, than an arrow, which, from its cuneiform shape, is better adapted to force its way through the elastic medium. It may be added, that an apparatus for saving lives from shipwreck, by Mr. H. Trengrouse, has been described in the *Transactions of the Society of Arts*.* In this apparatus the projecting force used is a *rocket*, and it was found that a rocket of eight ounces, having a macharel line attached to its stick, ranged to the distance of 180 yards, and that a pound rocket under similar circumstances ranged 212 yards. The rocket is placed in a copper instrument at the end of a musket charged with a small quantity of powder, without wadding, for the purpose merely of directing and igniting the rocket. The rocket, when ignited by the powder, burns for a few seconds before it acquires sufficient momentum to quit its situation, during which period the combustible would be ejected into the barrel of the gun, if it were not prevented by a loosely suspended valve, which opens to permit the passage of the charge, but immediately closes and hinders the barrel

* Vol. xxxviii. p. 161.

from being choked by the retrograde discharge from the rocket.

Captain Dansey's kite is described in the transactions of the Society of Arts. The line being passed through the cylindrical hole of a "messenger," the wind carries it up rapidly to the kite, where, striking against part of the apparatus, the upper part is thereby released, and by this means the head of the kite becomes reversed and instantly descends. The kite with which Captain Dansey made his experiments expended 1100 yards of line $\frac{5}{8}$ th of an inch in circumference, and would have taken even more had there been sufficiency.—It also took 360 yards of line $1\frac{3}{4}$ inch circumference, and weighing 60lbs. The holland which covered the kite weighed $3\frac{1}{2}$ lbs., the spars, (one of which was armed at the head with iron spikes for the purpose of mooring it) $6\frac{3}{4}$ lbs., and the tail was five times its length, composed of 8lbs. of rope, and 14lbs. of elm plank.—*Trans. Soc. Arts.* vol. 41.

Our great object has been to ascertain how far a simple, portable, and easily attained apparatus would subserve the purpose of forming a line of communication with the shore in the majority of cases of shipwreck; while it must be apparent, on a moment's reflection, that the principle may be applied to the largest piece of ordnance, and, even with increase of distance, still secure the integrity of the line.

In the first series of experiments, which were made at the signal stations, on the cliff at Whitby, and afterwards from the pier across the Bay, a three-pounder swivel was employed. The weight of the arrow was

nearly two pounds, and at an angle of about 45° , a stout line, the thickness of a maelarel line, with

2 ounces of gunpowder, was carried 104 yards.

$2\frac{1}{2}$ ounces.....do.....110 do.

3 ounces.....do.....130 do.

It was found essential to the success of these experiments that the arrow should be properly shielded at the butt-end by a plate of copper, and shod at its narrow summit with iron: and if the parallel iron rod, traversed by the ring, be preserved in its proper position by a shoulder and nut on the opposite side, as is indicated accurately in the plate and in the superior figure, and the ring be properly welded and made of sound tough iron, freely traversing the rod, the conditions of success are secured. It may be found advisable also to use a small portion of platted cord in immediate contact with the ring, or any other pliant and tough material, as a thong or strip of leather about six or eight inches long. In the blunderbuss, however, we found this altogether unnecessary. To diminish the effects of friction, the parallel rod may be rubbed with a little lard mixed with black lead; and a slip of cork towards the angle whither the ring glances, will, by its soft, pliant and elastic character, diminish the impetus of the ring by its necessary resiliency. This ring should be formed of a fasciculus, or bundle of tough wires, twisted together and moulded finally at a proper temperature into the required form. This method will amply secure the full amount of strength requisite. In subsequent experiments, made on the cliff in *the teeth of a strong gale of wind*, the arrow, which weighed exactly one pound and a half, with a charge of only two

ounces of gunpowder, carried a log-line 66 yards; and with $2\frac{1}{2}$ ounces, 70 yards.

In a suite of experiments made afterwards, when the same piece and elevation were used, the discharge was in the line of the coast, and nearly at a right angle to the direction of the wind, then blowing a gentle breeze:— With three ounces of gunpowder, the arrow, with the line, flew 104 yards, very steadily and accurately, in the direction of the object aimed at. With $3\frac{1}{2}$ ounces of powder, the sliding ring, from its having been improperly welded, broke, and the arrow, freed from its restraint, was carried to a distance of 307 yards. Upon examination, it seemed to have sustained no other injury than a slight curve in the longitudinal iron bar traversed by the ring. The prevention of this latter event is obvious and easy; and we are inclined, from subsequent experiments, to think, that an arrow, constructed entirely of laminated iron, yet hollow within, though of greater weight than the arrow of wood used in these experiments, would range to a much greater distance, and equally answer every purpose: a conclusion to which I was conducted by reflecting on the greater distance to which the musket in my earlier experiments carried an *iron rod*. Since these experiments I have had the most successful results with a blunderbuss—even still more complete, cheering, and satisfactory. The arrow used in the last case is so accurately represented in the plate, that any further description seems unequalled for. With strong whip-cord the arrow was carried to a distance of 87 yards by the force of two drachms of gunpowder, and with the most steady and perfect aim; and, in one instance, with $2\frac{1}{8}$ drachms, nearly one hundred

yards. The arrow was 18 inches long, and weighed $2\frac{1}{4}$ ounces, and the united weight of the cord and the arrow were 2 lbs. 1 oz.; the cord was sufficiently strong to pull a rope of considerable size from the shore to a ship.* In these experiments the blunderbuss used was of a very moderate size—sixteen inches long in the barrel, and $1\frac{1}{10}$ th inch in the bore. From all my experiments herewith, I feel satisfied that, in the greater number of cases of shipwreck, nothing more will be required than a blunderbuss: and when it is considered, that it is so easily obtained, so portable, and so suddenly carried into requisition, it becomes the more valuable in our estimation. In these cases there is little time for deliberation, and sending to a distance for individuals trained in all the art and mystery of gunnery, or in the removal of a heavy piece of ordnance. It has been stated, that 45 stations (59 were proposed) were alone supplied with Captain Manby's apparatus,—that their expense would be £4000, and cost about £2000 annually to keep the apparatus in requisite repair. A brass mortar is very expensive, and an iron one is in danger of bursting; but if these are only to occupy stations where there may happen to be a detachment of the Preventive Service, it would be extremely limited in the amount of good, and in the case of numerous wrecks at no great distance from each other, loss of life might be sustained at one spot, while the apparatus was in practice at another; thus, the apparatus stationed at Mundesley, being carried to a ship in distress three miles off, a transport in the mean time went to pieces at Mundesley, and all on

* See explanation of the plate.

board perished. In the Committee of 1810, it was mentioned that there appeared to be but two successful instances of the application of Captain Manby's apparatus on the whole western coast. There is, however, scarcely any coasting-vessel that could not command this simple matter, nor would they, it is presumed, be tardy to avail themselves of a principle that requires no nice tact to manage, however humble the register of the tonnage of such vessel might be. Vessels may be stuck fast on a bar at the entrance of a harbour, or on a sand bank, and be exposed to all the fury of the breakers, and a boat may not be able to get within 20 or 30 yards. This was the case, for instance, at Blakeney, on the 10th of Nov. 1810. "Twice, in one day," observes Captain Manby, "at Blakeney, in Norfolk, the boats with all their exertions, could not get nearer to the wrecks than 20 yards, and were the spectators of the crews of both perishing;" and there are innumerable instances of a similar description; and as has been remarked by Mr. Wheatley, after mentioning the fate of the *Hunter* cutter, and *Alb-cona*, of Sunderland, which were lost within 150 yards of the cliff, and no assistance could be rendered; that when the wind blows strongly to the northward, the sea runs up to the cliff, and there are few places where a boat can either get off or come ashore.

The mariner never dreams of shipwreck, though his life is in jeopardy every hour; but insurance-companies and ship-owners might require it at his hand, and the Custom-house, by its recommendation, urge the plea of necessity. In the most desperate and forlorn cases the life-boat may get within twenty yards of the wreck, and yet all the exertions of her gallant and hardy crew be

helpless and unavailing, from a shelving ledge of rocks and the breakers; or a sand-bank, with the furious waves lashing its surface; and such circumstances have repeatedly occurred: but in these cases the blunderbuss will supply all that is wanted, and a line carried in the life-boat from the shore might be easily extended from the life-boat to the wreck. In most cases of shipwreck, the only possibility of safety depends on communication with the shore. It is impracticable to send a line on shore attached to any float, because, as had been proved by Mr. Wheatley, the surf takes away the bight of the line. Suppose, however, a cask or spar, with a rope attached, were sent from the vessel, though it might drift away sideways, a barbed arrow shot over it from the shore would be sufficient to drag it to land; and with a few simple instructions, made always available by the crews of even the meanest coasting vessel, notwithstanding their antipathy to any provision against shipwreck, the blunderbuss and its arrow might be easily applied to all cases of shipwreck, however remote from the shore; and the money that would provide 60 of Captain Manby's apparatus would purchase *two thousand* of these! Each Custom-house, and every parish on the sea-coast, might be supplied with at least one stout blunderbuss, line and arrow, &c., which might remain at the manor-house or parsonage. Those who have witnessed my experiments, satisfied of their value, have approved of their being carried into full operation; that sequence rests not with me—it is enough that I have long reflected on the subject, and pursued my experimental enquiries through many anxious hours, and, by numerous repetitions in the path of enquiry, gradually improved and

matured the principle. My pecuniary sacrifices have been already considerable, and the dissemination of the invention, through this medium, cannot be expected even to remunerate me for the expence of publication: I shall now merely supply twelve sources with patterns and models of these arrows:—I can do no more than this—my means withhold my hand. But if the discovery shall eventually save the shipwrecked crew from perishing, I would not forego such an imperial remuneration for the wealth of Croesus or the mines of Goleonda or Peru.

From the ample and minute description of the invention figured in the plate, which is remarkably accurate, no further explanation is wanted, and would seem only mere repetition or unwarranted tautology. The globe of light will be a most important adjunct, when night reigns in all her sable majesty, and the tempest encreases the horrors of the scene. When a Swedish brig was driven on shore in the night of the 5th January, 1809, from the intense darkness which prevailed, seven hours elapsed before dawn, and the ship went to pieces before the requisite communication could be established. It is of the highest importance to bear in mind, that by far the greater part of the shipwrecks that take place on the British coast (and every winter teems with the melancholy tale), occur at distances from the shore not exceeding 50 to 100 yards. This distance is therefore inconsiderable, and the means now considered are amply sufficient. The coast of Scotland, from Montrose to Inverness, and that of Yorkshire, Suffolk, and Norfolk, together with the Isle of Man; and from the Mull of Galloway to the Mull of Cantire, present scenes of extreme peril during the equinoxes, and especially in the brumal

months; and all these abound with events wherein our simple apparatus would have saved numbers from a watery grave. We have singled out these localities, merely because we are personally best acquainted with them; but our sea-girt Isles afford innumerable ramifications of a similar kind. We suspect the loss of life by shipwreck, on the British coast, is far more considerable and formidable than is generally imagined. Thus it has been computed that, in twenty years prior to 1812, more than 800 persons perished on the coast of Norfolk alone, exclusive of the crews of those vessels known to have been totally lost. From Coartham and Redear to Holy Island, forty ships have been driven on shore in one gale of wind; and on 10th November, 1810, the crews of sixty-five vessels, an aggregate number of 500 individuals, perished off the North coast, within less than one hundred yards of the shore. Now a blunderbuss, a little larger than the ordinary size, might have been amply sufficient, in *all these* cases, to have established a communication with the shore, and a medium of escape from shipwreck; and we have also the authority of Captain Manby's statement of having personally witnessed many distracting scenes of whole crews perishing within one hundred yards of the shore, from the impossibility of forming a communication with the shore. But the *majority* of cases will be found, we believe, much less even than this. In the catastrophe off the Isle of Man, already referred to, the ship sunk, and the entire crew perished in the sight of multitudes collected on the beach, and within *less* than fifty yards of the shore. On the 18th February, 1807, His Majesty's Gun-brig, *Snipe*, was driven on shore near Yarmouth, and 67 persons lost, within fifty yards of the shore, from not being able to

convey a rope to the shore, after remaining five or six hours without the possibility of assistance being afforded; and 147 dead bodies were picked up after the gale, in an extent of coast not exceeding 30 miles. Mr. G. Holditch, pilot-master, of Lynn, observes, in a letter to Captain Manby, that he once rode out a gale of wind adjoining St. Abb's Head, in twelve fathom water, and the stern within fifty yards of the rocks, frowning above them, and no assistance could be rendered by those on the rocks. In a case stated by Mr. Curwen, before the House of Commons, a Liverpool Packet missed the harbour, and was lost within 60 or 80 yards of the shore, and from 30 to 40 persons perished. The *Queen Charlotte* was wrecked at Falmouth, in 1820, and I am informed, by an individual who witnessed the catastrophe, *within a stone's cast of the shore*, and from 200 to 300 persons lost. One survivor lost all his property, and consigned to the grave his wife and five or six children, his entire family; I believe only about 50 escaped.

It does not appear that Captain Manby's apparatus has ever been used at Devonport, where storms have been so destructive, and where that of November, 1824, will be long remembered. That magnificent and truly valuable structure, the *Breakwater*, in Plymouth Sound, is a noble shield of safety and of shelter, but its insurance cannot extend without its pale. I am indebted to an esteemed correspondent* for the following account of the storms of 1824, as well as the more recent one of December last, in relation to their effects at that port.

* G. Banks, Esq. F. L. S.

“ In 1806, Messrs. Rennie and Whidby laid their plans of the Breakwater before the Admiralty, and in 1811, an order in Council was issued, authorising the commencement of the work.—The first stone was laid on the 12th of August of the following year, and at the time of the November storm, the work was above the surface of the sea at high water. Of the advantages to the port, and the general utility of this noble undertaking, no greater evidence need be adduced than the fact, that in the storms of 1824, 1828, and 1830, all the vessels anchored within its angles, rode out the gales in perfect safety and comparative tranquillity. The storm of 1824 was predicted by the fishermen several days previous to its occurrence; and on Monday, the 22d, all vessels in sight of port bore up and came to what was considered safe anchorage. Catwater presented the appearance of a forest of masts, and 16 sail of vessels were at anchor in the Sound; among these, the *City of Rochester*, East-Indiaman, and several West-Indiamen; of these, four small vessels only remained in the Sound at the approach of daylight on the following day, and no fewer than 20 ships were ashore in Catwater; the height of high-water exceeded any thing within the knowledge of the oldest inhabitant, being 26 feet 2 inches rise, while the mean height is only 18 feet, at *spring-tides*; and the barometer fell to 28° 19'. As you wish to know the number of vessels lost, wrecked, and damaged, by this storm, I have given the names and particulars of each vessel wrecked. The *Loyalty*, Graham, master, from London for Trieste, dismasted and full of water, crew saved—*Scotia*, McCormick, from London, for the Cape of Good Hope, dismasted, and full of water—the *George Canning*, Frampton, (mate) from Denia, Capt. Chissell, drowned—Danish brig *Najaden*, Masse, from Altona for the Havannah, a wreck—the *Agnes*, of Ipswich, dismasted and full of water—*Richard*, Williamson, from London, for Demerara, dismasted and sunk at her anchors, chief mate drowned—the *Caledonian*, Thorn, from Newcastle, for Grenada, full of water—*Lapwing*, Richards, of Dartmouth, went to pieces, crew saved—*Nichols*, of Fowey, nearly a wreck, crew saved—Swedish vessel, *Concordia*, Hattland, from Finland, for Marseilles, a total wreck—*Mary Ellen*, Guild, from London, for Gibraltar—the *Two Sisters*, Jackson, from London, several of her

crew drowned—the brig *Mary* and *Eleanor*, of London, dismasted and bilged—brig *Star*, Moore, of London, a wreck, crew saved—*Eliza*, Edwards, of Dartmouth, stove in and sunk—brig *Female*, Chapman, from London, damaged—*City of Rochester*, Cotton, from London, very valuable cargo, bound to Madras and Bengal, bilged and dismasted—*Colonist*, Smith, from London, bilged and considerably damaged—*Zephyr*, Paddon, of London, a wreck—American ship, *Margaret*, McLellan, bilged—Swedish ship *Regenter*, Ostberg, from London, a wreck—ship *Perey*, Sayers, from London, bilged—brig *Retrench*, Arsell, from London, bilged and filled—*Ruth*, Humer, from London, for Jamaica, general cargo, bilged and filled—the brig *Hibernia*, Dyer, from London, for Waterford, totally lost under the citadel, three of her crew drowned; she had ten thousand pounds worth of plate, gold and silver, belonging to the Marquis of Waterford, part recovered—*Arrow*, cutter, bilged and filled—*Elizabeth*, Ledmond, from Archangel, with deals for Bristol, slightly damaged—brig *John Miles*, of Bideford, from Leghorn, bound to London, with a valuable cargo, drove on shore near the Mewstone, all hands drowned—brig *Welcome*, Morris, damaged—*Coromandel*, 110 tons, from Faro, total wreck, crew saved. In the storm of 1828—the schooner *Stephen*, Knight, Milton, total wreck—*Lavinia*, Gaswell, wreck—Norwegian barque, *Jupiter*, Horbye, master, cargo of salt, completely washed out, and vessel wrecked—Sicilian polacca, *Archangel Raphael*, Caviaro, considerably injured—the schooner *Elizabeth*, and the *Helen*, of Plymouth, were also driven on shore—*Cato* transport, Fairweather, bilged—ship *Jesse Lawson*, Church, master, for Van Dieman's Land, with a general cargo and passengers, back broken—*Heyden*, transport, much damaged—*John and Robert*, transport, total wreck—brig *Speculation*, Holland, much damaged—*Mary Ann*, much damaged—*Lord Mulgrove*, trawl, wrecked on the rocks near the Mewstone, all hands perished—the *Selina*, of South Shields, outward-bound for the West-Indies, struck on the Bolt-Head, near Salecombe, every soul perished. In the storm of December, 1830. Four vessels were driven on shore, and totally wrecked."

January 29, 1831.

In Captain Manby's ingenious Work will be found many useful suggestions for the structure of rope ladders to scale the cliff; of a cot or cradle to bring the young, or invalids, from the wreck, and other interesting contrivances; but this is a part of the question on which we do not propose to enter, and, indeed, when these are duly weighed and considered, would be one, to us at least, superfluous and unnecessary.

I should consider it both uncourteous and ungrateful to close this part of the question, without honorable mention of a most praiseworthy and noble Institution, which has sprung up amid the blaze of benevolence and philanthropy of these latter times: I mean the "National Institution for Preservation from Shipwreck." This monument of good, we believe, first originated with Sir William Hillary, Bart. now a resident at Douglas, in the Isle of Man,* in consequence of his "Appeal to the British Nation on the Humanity and Policy of forming a National Institution for the Preservation of Lives and Property from Shipwreck;"† and by a letter which I received from Sir William, am rejoiced to find that this Institution is well supported, and that its advantages are more and more appreciated, while its success uniformly increases and expands.

NE PEREAT.

No country on the surface of the globe can rival this happy land of our's in the exercise of benevolence, or

* I am sorry to find that Sir Wm. Hillary has been seriously injured in a recent attempt to save from shipwreck in a storm off Douglas—a shore fruitful in such catastrophes.

† London, Whittaker, 1823, second edition.

the display of a warm-hearted and generous philanthropy. Let the appeal be properly made, or its importance brought into a tangible form and rendered evident, and there immediately succeeds the animating struggle of numbers pressing forward to inscribe their names in support of its progress and permanence ; and apart from the multitude, we find the British Throne feelingly alive to merit, and anxious to reward it. If numerous proofs were wanting, we might be specific ; it will therefore be merely necessary to state, and it is well worthy of marked record, that GEORGE III. conferred on Lord Exmouth the title of *Baronet*, for his successful exertions in saving the crew of an East-Indiaman, wrecked off Plymouth, achieved at extreme personal risk, and when the situation of all on board seemed to defy the best exertions of human aid. This was a reward alike honourable to the Royal donor, and to the recipient of the boon, and amply deserves a register in the roll of fame.

The following are the objects of this excellent Institution :—

“ *First*, The preservation of human life from shipwreck ; which should always be considered as the first great and permanent object of the Institution.

Secondly, Assistance to vessels in distress, which often immediately connects itself with the safety of the crews.

Thirdly, The preservation of vessels and property, when not so immediately connected with the lives of the people, or after the crews and passengers shall already have been rescued.

Fourthly, The prevention of plunder and depredations in case of shipwreck.

Fifthly, The succour and support of those persons who may be rescued, as medical aid, food, clothing, &c.—These benevolent exertions to embrace the natives of every clime and nation.

Sixthly, The bestowing of suitable rewards for such meritorious exertions, and provision for the families of those who may lose their lives in these noble attempts to save their fellow-creatures.”

These objects being self-evident and of high importance, we have no fears for their success and triumph. It is a compound act of justice and mercy; nor will means for extending its sphere of usefulness be withheld. Our naval armament is Britain’s glory, and her naval sons our island’s pride. Commerce is the sheet-anchor of our national prosperity, and those who participate in these gifts of Providence are not ungrateful; nor will they, by withholding the requisite means of support, become suicidal to their dearest and best interests.

GENERAL OBSERVATIONS.

It may not be altogether irrelevant to remark, that this principle may be applied to a number of beneficial purposes, apart from the main object of its invention.

I. It frequently happens that a ship, entering the harbour in a storm, may not be able to weather the pier-head, and thus be drifted to leeward and dashed to pieces among rocks. Whitby has afforded examples of this kind, and illustrates the position; but a line may thus be sent on board with extraordinary facility, and the ship secured and brought into the harbour. This important security, guaranteed by means so simple, is well worthy of the serious attention of the Committee at Lloyd's; and this interesting application was hailed by a ship-owner at Whitby, as important.

II. When the Royal Mail packet enters the Roads in a gale of wind, it is sometimes extremely hazardous to get on shore. We have witnessed this difficulty and danger, and it may oftentimes be altogether impracticable. It is obvious that the letter-bag, secured from wet by an envelope of waterproof materials, and made otherwise buoyant by cork, could thus be instantaneously and safely conveyed on shore. In the recent

catastrophe of the Irish steam packet off the rocks at Portpatrick, the letters were entirely lost, and at this moment repose at the bottom of the sea, unless since recovered by the diving-bell.

III. In accidents from the breaking of ice on rivers, canals, ponds, &c., when the unfortunate individual cannot be approached without imminent danger to the adventurer who may put his life at a venture and dare the rescue, this would yield him possession of the means of security ; and, as the Royal Humane Society have always wisely stationed, at the post of danger, as on the Serpentine River, during the prevalence of ice, an ostensible person to afford the requisite aid in case of accident, such individual could easily be supplied with instructions necessary for this purpose.

IV. In this way, too, might a message by letter or tally be instantly transmitted on shore from a ship in distress, or tempest-tost in the offing, when signals would be unavailing, and the aid required at once supplied without any secondary or intermediate communication ; and any event on board announced more rapidly than the intelligence of the telegraph. When ships are disabled by action with the enemy, or crippled and unmanageable by the storm, and when communication by means of boats, from their having been washed overboard, or the prevalence of the gale, may be altogether impracticable, this apparatus presents a medium of communication, and any written message may be thus instantly conveyed. The blunderbuss and arrow are together a very simple affair, and simplicity is a charm, while it has been our grand aim.

V. When a bridge of boats is swept away by inundations, or stone or wooden bridges carried off by the furious debacle, this affords the means of immediately restoring the communication between the opposite banks; and a rope being thus established, the transmission of parcels and letters, or the flotage of a raft across, are thus effectively and safely guaranteed.

VI. To name only one more important and valuable application may suffice, though many more might easily be stated:—In cases of fire, the arrow might be projected over the roof of the loftiest buildings, and the line attached to an extended rope ladder, would thus be the means of establishing an immediate means of escape on *both sides*, either from the roof or the upper stories, to which the unfortunate inmates generally fly as a forlorn hope; and this escape-ladder might be shifted in a moment to any part of the range of the building, either on one side or on both together. Were we to say more, our observations might seem unnecessarily extended and even thereby attenuated, and assume too much of the aspect of a *Catholicon*—the jest of a sober inductive philosophy. Nor can it be at all necessary, as the ingenious mind will easily recognise them, and judge for itself.

Some general hints to the mariner may not be irrelevant, and perhaps useful and important ideas be built upon the generalization:—

I. In storms, considerable difficulty may be experienced in firing the signal of distress, and there may be circumstances under which it is altogether impracticable—the

sea-spray may have extinguished every light on board, and thus no match could be ignited. To substitute this desideratum, it is merely necessary to apply to the touch-hole a small portion of a mixture of chlorate (oxymuriate) of potassa and sugar candy; and these, it is necessary to observe, should be triturated in *separate* mortars, and afterwards mixed intimately with a slip of paper, and with as little friction as possible. This, when applied to the touch-hole, and a few drops of sulphuric acid let fall on it, will fire the gun and announce the danger. A few winters ago, His Majesty's frigate, *Leipsic*, was in a storm off the bar of Yarmouth: no intelligence of their perilous situation could be announced by the signal-gun; the breakers had already extinguished all the fires and lights on board, and with these, even *hope* had almost expired. Lieutenant Woodyear, however, had, providentially, that very morning been making experiments with the mixed powder referred to, among other chemical experiments, and it therefore readily occurred to him, that such would afford the means of firing the signal of distress;—it was done, and relief obtained from the shore; and without this, in all human probability, the *Leipsic* and her gallant crew must have found a watery grave. This is one eventful happy illustration, among thousands that could be enumerated, of the successful application of chemical principles to useful purposes—the great end which it has been my anxiety to elucidate in my public lectures.—From the danger resulting in the employment of percussion powder, I have been desirous to find a safe and efficacious substitute. *Fulminating mercury* will, by percussion, always ignite gunpowder. It is not affected by damp, and I find that its explosive phenomena are quite peculiar. When

fulminating silver is ignited, there is a violent action in a downward direction, so that if held on a slip of paper over a candle, the paper is not only perforated, but the candle extinguished and even rent, and when this fulminating metal has exploded accidentally under a bell-glass resting on a table, that bell-glass has been raised only a few inches and sustained no injury, while the table has been perforated by a hole more than an inch diameter ; when ignited it explodes, and does not merely inflame. It is very different with fulminating mereury : when placed on paper and held over flame, I find that it is kindled like a flash of gunpowder, at a temperature insufficient even to *char the paper*, and far inferior to that required for the ignition of fulminating silver. It does not *explode* like the latter, but is merely inflamed ; and the paper is not perforated, nor does it sustain any injury whatever. We think it much safer than the percussion powder, and it is not liable to be affected by damp, while it seems more certain in the issue ; still, however, the *inferior temperature* at which it is ignited must be kept in remembrance ; and so long as the fowling piece is *cool*, there can be no question as to the advantage of its application. In cases, however, when the piece gets heated, by frequent use, the percussion cap must needs be constructed of a *non-conducting* material—not *metallic*. These last remarks do not apply exclusively to sportsmen, but have an inclusive reference to the attachment of a percussion lock to cannon and the blunderbuss.

II. We would suggest, for the consideration of the
 “ National Institution for Preservation from Shipwreck,”

the training of the Newfoundland dog, for the purpose of bringing a rope on shore from the wreck, or carrying one to the ship. Already has this useful ally of humanity been eminently serviceable in rescuing individuals that have accidentally fallen into the Seine, or have taken the desperate leap to commit suicide. Mr. Wheatley mentions, in a letter to Captain Manby, the case of a Newfoundland dog who swam on shore with the lead line, by means of which seven seamen, the mate, and himself were eventually saved ; and not long ago, one of the Saint Bernard dogs, the property of a gentleman in Cheshire, was the means of establishing a communication with the shore on that coast, by carrying a rope to a vessel in distress, under circumstances which threatened instant shipwreck, and which eventually saved the crew. These noble animals, however, are identified with the dearest interests of humanity, and their deeds amid the snows and glacières, the avalanche and debacle of the Saint Bernard, deserve a monument formed of more durable materials than either brass or marble.

III. In numerous experiments made both in the Mediterranean and in St. George's Channel, I have, as appears to me, clearly proved that the temperature of the sea rises prior to a storm, and continues to decline after the gale has reached its maximum. We believe that Capt. Livingston has verified the remark. This being the case, attention to the temperature of the sea may be the means of affording notice of the coming tempest, and the presage prevent the mariner from being taken by surprise. We are aware that this temperature will be affected by shoals ; but circumstances being similar, the indication will be found to hold good.

IV. In our "Researches in Natural History," we have mentioned that an encreased brilliancy in the luminous appearance of the ocean precedes the tempest, and its greater characteristic intensity on the coast becomes an index of its approach. The phosphorescency of the sea is now universally admitted, notwithstanding a recent opinion to the contrary, to be dependant on the presence of marine *molluscæ*, or minute *crustacæ*, particular kinds of which are invested with the gift of light. A specific temperature, as we have ascertained, is necessary for this exhibition, and that to a certain point it encreases with the rise of temperature. This encrease of brilliancy is, therefore, a necessary consequence of the preceding, in reference to the *same* luminous marine animalculæ, indigenous to any specific spot. That luminous marine animals may have a geographical distribution in the ocean, seems to me a reasonable conclusion, and this diversity between tropical seas and the temperate and polar latitudes, is a point tolerably well ascertained by scientific navigators: the agitation of marine currents and tidal influence would disturb this isothermal curve, and transport the more brilliant medusæ, cancri, &c. to other climes. Mr. Thompson, in his original and ingenious researches, has shewn that the altered character in the light which illuminates the sea may give ample warning of the approach of soundings or that of breakers. Yet, though these be oracles that may be safely and usefully consulted by the mariner, it has never been our wish to supersede or decry the barometer or sympiesometer; but we do not see why the former should not be auxiliaries to the latter.

V. It had been stated, first by Dr. Franklin, and since often recognised, that *oil* possesses the power of stilling the waves of the sea; and we believe that frequently, under peculiar circumstances on a lee shore, this fact, if attended to, might be of eminent service to quench the breakers, and thus aid in establishing a communication with the shore.

VI. Our experiments on a model of the life-boat, limited though they may have been, seem to prove that *broad elastic fins*, attached to the sides, would prevent the life-boat from ever being overturned by the waves; and though in ordinary cases the original position be immediately recovered, and the boat soon righted, it disconcerts and disarranges the crews, and momentarily paralyzes their efforts.

FINIS.

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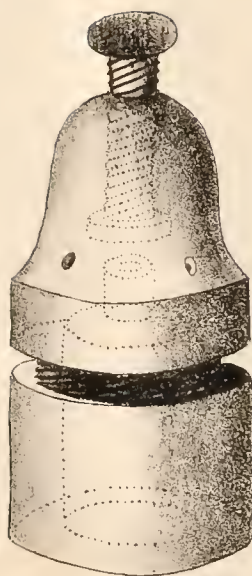
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